

From: John L Swanson[SMTP:JOHNLSWANSON@FRONTIER.COM]

Sent: Friday, July 08, 2011 8:44:13 AM

To: BRC

Subject: Draft RFCT Report

Comments on the draft report of the BRC's Reactor and Fuel Cycle Technology Subcommittee

John L. Swanson  
1318 Cottonwood Dr.  
Richland, WA 99354  
509-946-7871

[JohnLSwanson@frontier.com](mailto:JohnLSwanson@frontier.com)

## GENERAL COMMENTS

GC-1) In general, I give this report a "well done" rating. However, it can certainly profit from editing for consistency, for correcting some badly "mangled" sentences, for correcting some sentences that don't say what is meant, and for correcting some errors. I hope that my comments will aid in such an endeavor (in some cases, I suggest possible changes).

- Also, some/much of the report suffers from the use "buzz words/terms" that, while a limited audience might be familiar with their use/meaning, should not be used in a report aimed at a large, diverse audience (as I believe the BRC's report should/will be).
  - In addition, the "Acronyms List" is not complete.

GC-2) Throughout the report, there are instances where it is "stated" that GTCC (or TRU) waste will be "repository waste". I have no problem with that concept, and had assumed it for years myself; HOWEVER, an environmental impact statement addressing disposal of GTCC waste is currently being prepared by DOE – and this document does not consider repository disposal of such wastes to be a "given". I think that this (BRC) report should address this question "upfront", and say something like "in this report we are assuming that GTCC waste will be disposed of in a geologic repository".

- Doing this would remove the concern of many of my comments that were written before I realized the extent of this problem.

GC-3) Another troubling issue is that some sentences presented opinions/perceptions (of undocumented sources) as facts. This was especially troubling when the "statement of fact" disagreed with my opinions/perceptions (which were developed over decades of activities involving the back end of the nuclear fuel cycle). Examples include the assertion regarding Federal funding for the reprocessing of commercial spent fuel (Comment NFCB-4) and the assertion that the NWPAs assumed very little growth of the nuclear industry (Comment NFCB-5). When providing a historical perspective, it's always nice to be historically accurate.

## EXECUTIVE SUMMARY

ES-1) I think that the two conclusions given on page v should be "highlighted" in some way – in order to emphasize them more. One way to help accomplish this would be to make this paragraph the second one in the section (the questions posed in the first paragraph would

then be answered in the second paragraph). Another way would be to present the “conclusions” in bold type (as the “recommendations” are). Better yet – do both.

- Also, the first sentence – speaks of “conclusion is”, but there are two conclusions – so say “conclusions are”? (The first line on vi does say “conclusions are”)

ES-2) Page v, last paragraph – Says “Rather, there is a benefit to preserving and developing new options.” I’m not sure what is meant here, and I think the wording should be changed to clarify.

- This could be taken to mean that the Subcommittee believes that ONLY new options warrant preserving and developing?
- What options are considered to be NEW? (An option that was first studied years ago might be considered to be new by some people, but old by others.)

ES-3) Page vii, first sentence – Says “In the effort to target scarce resources ---.” Is this a proper use of the word “target”? It seems strange to me.

ES-4) Page x, last sentence – I am surprised at the speculative nature of this sentence (“The [sic] apparently believe that ---, or perhaps they assume higher prices of uranium and enrichment and lower costs for reprocessing.”). I think that the Subcommittee could/should have DETERMINED what the decision-making processes were in these countries, instead of speculating what they might have been.

ES-5) Page xi, first sentence of first paragraph – Says “In contrast, there is much less uncertainty ---- challenges we face in the decades ahead.” I think the meaning is “decades immediately ahead” or “in the next several decades”. Clarify?

## **NUCLEAR FUEL CYCLE BACKGROUND**

NFCB-1) Page 1 – says “---the once-through cycle as currently practiced ---.” Change to “--- the once-through cycle as is currently practiced in the United States ---.”? (I later found these very words on page 6)

NFCB-2) Page 2, first sentence – make it “--- controlled nuclear fission --.”?

NFCB-3) Page 2, second sentence – Says “Fission technology was then used in the atomic weapons ---.” This overlooks the use of fission technology in the production of the plutonium that was used to demonstrate the practicality of an atomic weapon, and in the second weapon used in the war. Expand this discussion?

NFCB-4) Page 3 says – “The decision by the Ford and Carter administrations not to provide Federal funding for reprocessing of commercial spent fuel, which was based primarily on proliferation concerns, ---.” This sentence isn’t “slanted” the way I recall things; please check its validity regarding “Federal funding for reprocessing of commercial spent fuel”. (I don’t believe that there ever was an intent for the Federal [or any other] government to pay for the reprocessing of commercial spent fuel. My recollection is that, while West Valley did receive some Federal support in the nature of payments for reprocessing of some Federal-owned fuel, the subsequent reprocessing ventures were strictly commercial and received no Federal funding – until after reprocessing of commercial fuel was “banned” because of proliferation concerns, and some Federal funding was then given to Barnwell (at least) to “ease the pain” of

not being allowed to proceed with their venture.)

NFCB-5) Page 3 contains the assertion that the Nuclear Waste Policy Act assumed very little nuclear energy development in the U.S. beyond the plants that existed at the time. I question the validity of that assertion, and doubt that it is a widely-held belief. For one thing, the NWPA does address high-level waste from reprocessing activities – and no commercial fuel reprocessing plants were operating at the time the NWPA was written. For another thing, the NWPA addresses the steps to be used in siting additional high-level waste repositories as the quantity of spent fuel continues to increase.

NFCB-6) Page 6, second sentence – says “It is intended for the non-expert reader ---.” That’s fine and good, but then it should not use “shorthand phrases” that are not defined, and are therefore ambiguous to a non-expert reader (and to many expert readers also).

NFCB-7) Page 14, second paragraph – speaks of “non-chemical” methods to process spent fuel, and says that the DUPIC process is an example of such a process. I believe that the DUPIC process involves oxidation and reduction of uranium oxides; these are certainly chemical processes – so a different descriptor than “nonchemical” should be used for such processes.

Also, in the same paragraph, is “--- so there is no overall separation of ---.” - change to “--- BUT there is no overall separation ---.”?

NFCB-8) Page 15, near bottom – says “Reprocessing of spent fuel once or a few times” followed by “Incorporating some processing products into new fuel”. Better wordings would be “Reprocessing of spent fuel” and “Incorporating some recycle products into spent fuel once or a few times”.

NFCB-9) Page 15, bottom – speaks of “transuranic wastes”. That is a term that has been used extensively in the past, but is not really proper to be used now (when discussing commercially-generated wastes, especially). Commercially-generated wastes that contain above the specified level of transuranic alpha activity are now included in the category of Greater-Than-Class- C Low-Level Waste (GTCC LLW).

NFCB-10) Page 16, first sentence – says “--- transuranic contaminated wastes such as cladding hulls require geologic disposal ---.” That may indeed be the best way to handle such wastes, but such a decision has not yet been made (and the GTCC LLW EIS that is currently “in the mill” doesn’t address wastes from possible future reprocessing activities). (See Comment GC-2)

NFCB-11) Page 16, second sentence – says “The aim is to recycle elements that can be used for fission.” I believe that to be only one of the possible aims; say instead “A primary aim ---.”

NFCB-12) Page 16, third sentence should be reworked. It isn’t true that interim storage can reduce the decay heat generated by fission products – as is said there. It is true that the heat generation rate due to fission products is lower after interim storage than it is early in the decay period – but that isn’t what is said here.

NFCB-13) Page 16, second paragraph, first sentence – says “The reduction of long-term repository doses by the transmutation of very long-lived elements depends on the specific repository environment.” The “repository dose” (dose to the repository) does NOT depend on the repository environment; the “dose to man due to releases from the repository” does

depend on the repository environment.

- This may be an instance of “jargon” that is understandable to those in the field, but not to others.

NFCB-14) Page 16, second paragraph, last sentence – “--- will contain small amounts of transuranics and thus will also require deep geologic disposal.” Change to something like “---will likely also require ---.” (See comment NFCB-10)

NFCB-15) Page 16, last sentence – “--- fissile material is expected to come from recycled LWR spent fuel (such as from reactors operating on a once-through fuel cycle ---).” That strikes me as being internally inconsistent; I don’t think the parenthetical stuff is needed. Delete it?

NFCB-16) Page 17, first paragraph – “--- in shielded hot cells ---.” This is not consistent with page 15, where it says “--- (either with glove boxes or in shielded hot cells).” I think the page 15 version is better.

NFCB-17) Page 17, last sentence – Sentence doesn’t “hang together”; I think some words (and punctuation?) are missing.

NFCB-18) Page 21, last paragraph – describes steps of the once-through fuel cycle (including reactors), says that special facilities are necessary for each step, and that the NRC regulates 14 of these facilities. Shouldn’t it be specified that these 14 facilities are “in addition to reactors”?

NFCB-19) Page 23, first paragraph – Two sentences in the middle speak of what “The MOX facility” will do. Shouldn’t these sentences be moved to the end of the paragraph – following description of the need for (and construction of) “the facility”?

## **EVALUTION(sic) OF FUEL CYCLE ALTERNATIVES**

EFCA-1) Page 29, first lines – change “from production of fuel” to “from plant operations”? (Since the sentence applies to more than fuel production plants)

EFCA-2) Page 32, second paragraph – Haven’t MOX fuels also been used in some reactors in the U.S.?

EFCA-3) Page 34, Table 5 – Says “Clad uranium- and mixed-oxide fuels ---.” Change to “Clad uranium metal and mixed oxide fuels ---.”?

EFCA-4) Page 35, Table 5 – Does the LWR Modified Open Cycle really create higher inventories of separated Pu than the Fast-Spectrum Reactor with Closed Fuel Cycle??

EFCA-5) Page 36, Table 5 – Re repository space requirements. Apparently “space requirement” is being equated to “heat load” here; I don’t believe that to be generally valid, especially for large claimed decreases in space requirements.

- Also, doesn’t the degree of “equality” between space requirement and heat load vary among different repository media?
- Also, many places in this report have discussed the need for repository disposal of TRU/GTCC wastes – which appears to be ignored here.

- EFCA-6) Same place – Change “If Cs and Sr are then removed ---.” To If Cs and Sr are also removed ---.”??
- EFCA-7) Same place – The Cs and Sr fraction(s) would have to be highly decontaminated from TRUs in order for this fraction to be “non-TRU waste” (so it might have to go to a repository anyway).
- EFCA-8) Page 39, second paragraph in “Sustainability” – Says “--- because the fissile content of the plutonium is degraded --- and eventually cannot be recycled ---.” Not a good sentence.
- EFCA-9) Page 40, first paragraph. Shouldn’t “principal” be changed to “principle”? (in two places)
- EFCA-10) Page 41, last sentence – doesn’t make sense. It appears that portions are missing.
- EFCA-11) Page 42, first and second paragraphs. Change “civil” to “civilian”? (We’re not in England here). -Also on page 43 EFCA-12) Page 44, near bottom – says “heavily shielded hot cells”. See NFCB-16.
- EFCA-13) Page 45 – What is meant by the term “radiological sabotage”? (I saw it a page or two earlier, too). Newly-invented terms should be defined (or, better yet, not be used).
- EFCA-14) Page 47, fourth line – The term “technology waste” is introduced, and (kudos for doing so) defined in a footnote. However, unless the term is going to be used throughout the report, why not just use the descriptor words (e.g., contaminated equipment, protective gear, etc.) here instead of the term? (I didn’t see the term used anywhere else)
- EFCA-15) Page 47, third line from bottom. Change “significant” to “significantly”.
- EFCA-16) Page 48, second sentence under “Volume of Waste” says “The cost and occupational risk of a number of fuel cycle and waste disposal operations depend on the waste volume or the number of waste packages, as well as the engineered barrier system required for a specific geologic repository.” This troubles me in at least two ways;
- It can be taken to mean that a small volume of very hot waste can be disposed of more cheaply and safer than a larger volume very cold waste. I don’t believe that to be the general case.
  - Shouldn’t it say “—for a disposal site.” Instead of “--- for a specific geologic repository.” (to include other than repository wastes)
- EFCA-17) Same paragraph – Says “Repository waste includes ---- GTCC wastes ---.” See Comment NFCB-10.
- EFCA-18) Same paragraph, last sentence – More correct wording would be “The volume of ---.”
- EFCA-19) Next paragraph – Many too many abbreviations used here!
- EFCA-20) Same paragraph – This whole discussion is “tainted” by the (unstated) assumption that GTCC will be “repository wastes” (See Comment NFCB-10, and many others).

- Also, see Comment GC-1; it was at this point in my review that I wrote GC-1.

EFCA-21) Same paragraph – Based on what is said in the third sentence, I don't see how the second sentence's that "The LWR MOC generates about the same waste volume as the OT LWR ---." Can be correct (because the LWR MOC involves reprocessing and recycled fuel fabrication).

EFCA-22) First paragraph in Repository Space Requirements – Is this definition of "repository space" (areal extent) one that is generally accepted? Why not say "repository area" – and leave "repository space" to refer to the "mined volume"?

EFCA-23) Same paragraph - Says "--- interim storage --- can greatly reduce the total heat released by the fission products ---." Not a true statement (see Comment NFCB-12).

EFCA-24) Next paragraph – Speaks of "volume of repository space" – thus, we have "volume of repository areal extent" (see EFCA-22). More clear wordings would be very beneficial here.

- In the last paragraph of this section is "repository spacing" (yet another term).

EFCA-25) Page 50, first paragraph. See Comments EFCA-6 and -7.

EFCA-26) I'm well out of my areas of expertise, here – but I can't help but wonder if the whole discussion in "Repository Space Requirements" is really true "in general" (I understand that it is true for Yucca Mtn. but wonder about repositories in media that have different heat conduction properties.)

## **RESEARCH AND DEVELOPMENT**

RD-1) Page 70, second line – Says "--- recycled reactor fuel (MOX, for example) must be assembled remotely and will require heavily shielded --- facilities." I think that's an overstatement of the need. See Comment NFCB-16.

RD-2) Page 72, near bottom (and page 73, near top) – speaks of "the new nuclear waste management organization". I don't recall having seen any mention of such an entity earlier in this report – and it seems worthy of some explanation. Also, the word "the" (as opposed to the word "a") implies that it is an existing organization – which I don't believe is the case.